DOCUMENT RESUME

ED 441 821 TM 030 855

AUTHOR	Paik, Chie Matsuzawa; Michael, William B.
TITLE	A Construct Validity Investigation of Scores on the Japanese Version of an Academic Self-Concept Scale for a Sample of College Students.
PUB DATE	2000-04-00
NOTE	26p.; Paper presented at the Annual Meeting of the American Educational Research Association (81st, New Orleans, LA, April 24-28, 2000).
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*College Students; *Construct Validity; *Factor Structure; Foreign Countries; Higher Education; *Japanese; Reliability
IDENTIFIERS	*Academic Self Concept; Confirmatory Factor Analysis; Self Report Measures

ABSTRACT

The twofold purpose of this study was to investigate the reliability and construct validity of scores on the Japanese version of an academic self-concept scale titled the Dimensions of Self-Concept (DOSC) Form H and ascertain any relationships between scores on the DOSC scale and selected demographic variables, including class, gender, and self-reporting academic achievement. Confirmatory factor analysis served as a method of investigation. The original English version of the DOSC scale is a 96-item self-report questionnaire comprising 6 subscales, each representing 1 of the 6 hypothesized dimensions of academic self-concept: (1) Level of Aspiration (ASP); (2) Anxiety (ANX); (3) Academic Interest and Satisfaction (AIAS); (4) Leadership and Initiative (LAI); (5) Identification versus Alienation (IA); and (6) Stress (STR). A total of 177 students at a small private college in Kanazawa, Japan completed the Japanese version of the measure. Internal consistency factor analysis revealed that among several alternative models, the a priori six-factor model afforded the best fit. Comparisons of scores by demographic variables revealed a significant difference between males and females on scores of the LAI subscale, between high achievers and low achievers on scores of the ASP, AIAS, and LAI subscales, and between freshmen and sophomores on scores of the ASP, AIAS, IA, and STR subscales. (Contains 3 tables and 22 references.) (Author/SLD)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 441 821

A Construct Validity Investigation of Scores on the Japanese Version of an Academic Self-Concept Scale for a Sample of College Students

Chie Matsuzawa Paik

United States Naval Academy

William B. Michael

University of Southern California

Paper presented at the annual meeting of the American Educational Research Association, April, 2000. Address correspondence to: Chie M. Paik, Language Studies Department, United States Naval Academy 10C, Annapolis, MD 21402, chiepaik@nadn.navy.mil, (410) 293-6356.

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☐ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Chie Paik

RUNNING HEAD: A Japanese Version of an Academic Self-Concept Scale

TM030855

BEST COPY AVAILABLE

Abstract

The twofold purpose of the present study was to (1) investigate the reliability and construct validity of scores on the Japanese version of an academic self-concept scale titled the Dimensions of Self-Concept (DOSC)-Form H and (2) ascertain, if any, relationships between scores on the DOSC scale and selected demographic variables including class, gender, and self-reporting academic achievement. Confirmatory factor analysis served as a method of investigation. The original English version of the DOSC scale is a 96-item self-reporting questionnaire comprising six subscales, each representing one of the six hypothesized dimensions of academic self-concept: *Level of Aspiration* (ASP), *Anxiety* (ANX), *Academic Interest and Satisfaction* (AIAS), *Leadership and Initiative* (LAI), *Identification versus Alienation* (IA), and *Stress* (STR). The Japanese version of the DOSC scale comprised the same items representing the same six dimensions. A total of 177 students attending a small private college in Kanazawa, Japan completed the questionnaire. Internal consistency reliability of scores on the six subscales ranged from .82 to .87. Confirmatory factor analysis revealed that among several alternative models, the *a priori* six-factor model afforded the best fit in terms of χ^2, χ^2/df, NNFI, NFI, CFI, and RMSEA. Comparisons of scores by demographic variables revealed a significant difference between males and females on scores of the LAI subscale, between high achievers and low achievers on scores of the ASP, AIAS, and LAI subscales, and between freshmen and sophomores on scores of the ASP, AIAS, IA, and STR subscales.

A Construct Validity Investigation of Scores on a Japanese Version of An Academic Self-Concept Scale for a Sample of College Students

Studies of Michael and his colleagues in the past have produced four different forms of an academic self-concept scale titled Dimensions of Self-Concept (DOSC), Form E, S, H, and W. Each of the four forms, essentially parallel in content, was developed for use by a specific population. The DOSC scales, Form E, S, and H (Michael, Smith, & Michael, 1989) measure academic self-concept of students in elementary school, secondary schools, and higher education, respectively, and the Form W (Crowder and Michael, 1989a, 1989b, 1991) measures job-related self-concept of adults in the demanding, stressful workplaces.

The academic DOSC scales (E, S, H) as well as the workplace DOSC scale (W) embody a theory of multidimensional, interactive constructs of self-concept. The academic DOSC scales (E, S, H) comprise five subscales measuring the five hypothesized factor dimensions associated with academic self-concept: *Aspiration* (ASP), *Anxiety* (ANX), *Academic Interest and Satisfaction* (AIAS), *Leadership and Initiative* (LAI), and *Identification versus Alienation* (IA). The workplace DOSC scale (W) comprises six subscales: ASP, ANX, LAI, IA, Job Interest and Satisfaction (JIAS), and a sixth subscale representing the sixth hypothesized factor dimension labeled *Stress* (STR).

Extensive psychometric analyses employing exploratory and confirmatory factor analyses on the five-factor academic DOSC scales (E, S, H) in the past years yielded evidence for the construct validity of scores on the five-factor (ASP, ANX, AIAS, LAI, IA) DOSC scale (Michael *et al.*, 1989). Two studies (Foraker & Michael, 1994; Smith, Michael, & Gribbons, 1997) following the development of the DOSC, Form W (Crowder *et al.*, 1989a, 1989b, 1991) also provided promising evidence for the construct validity of scores on the six-factor (ASP, ANX, JIAS, LAI, IA, STR) scale. Several cross-cultural studies involving the two forms of the five-factor DOSC scales, Form H for college students (Al-Samarrai, Michael, & Hocevar, 1993; Villar, Michael, & Gribbons, 1995a, 1995b) and Form S for high school students (Paik & Michael, 1999) examined whether construct validity of the scores on the five-factor (ASP, ANX, AIAS, LAI, IA) DOSC scale could be realized in samples of students in different cultures. In general the results yielded a promising support for the construct validity of scores as those originally hypothesized in the English version of the five-factor DOSC scales, Form H and S.

The most recent study (Paik & Michael, in press) involving a sample of college students in the U.S.A. adapted a sixth subscale, Stress (STR) originally associated with the work-related self-concept (DOSC, Form W) to the DOSC, Form H. The results of confirmatory factor analysis indicated a plausibility of the *a priori* six-factor model. An impetus to include a sixth subscale, STR in the DOSC scale for college students was an assumption that college students burdened everywhere today with extra-curricular

activities such as community work, sports, and part-time employment would most likely undergo stress similar to that experienced by adults in demanding workplaces. Several sources (Reisberg, 2000; Wilgoren, 2000) supported this assumption.

The present study investigated the reliability and construct validity of scores on the Japanese version of academic DOSC scale, Form H for college students. An earlier study (Paik & Michael, 1999) involving the Japanese version of the DOSC scale (Form S) for high school students provided a promising empirical support for the construct validity of scores on a five-factor DOSC scale (Form S) through confirmatory factor analyses. The present investigation employed a six-factor DOSC scale, Form H with a sixth subscale (STR) adapted from the DOSC scale, Form W. In Japan college years mark the end of competitive entrance examinations for students on one hand and the beginning of their search for lifetime employment on the other hand. With the country's declining economy search for good jobs among college students is becoming increasingly more difficult. The inclusion of the STR subscale, therefore, seemed justifiable in the present study.

Purpose

The primary purpose of this investigation was to investigate the reliability and construct validity of scores on a Japanese version of an academic self-concept scale for college students titled the Dimensions of Self-Concept (DOSC) scale, Form H. A secondary purpose was to investigate relationships, if any, between the scores on each of the six subscales (ASP, ANX, AIAS, LAI, IA, STR) and the three selected demographic variables (class, gender, and academic achievement). The results of previous studies (Al-

Samarrai *et al.*, 1991; Villar *et al.*, 1995a, 1995b) on the DOSC scale, Form H involving Arab and Brazilian college students suggested that a relatively moderate to high degree of invariance exists across culturally diverse samples in the constructs of academic self-concept as measured by the DOSC scale. The present study provides additional data and information regarding the reliability and construct validity of scores on the DOSC scale, Form H. It is also of interest from another cross-cultural perspective to ascertain whether the same constructs can be realized for Japanese college students as for their U.S., Arab, and Brazilian counterparts.

Method

Participants

A total of 177 college students majoring in English in a small college in Kanazawa, Japan participated in this study. The college is located away from metropolitan cities of Tokyo and Osaka. Their teaching emphasizes the importance of cross-cultural communication, educating students to develop broader perspectives on issues relating to domestic and international affairs. Their curriculum requires students in English major to study abroad one summer before graduation; the college also invites students from other countries to its campus every summer for study of the Japanese language and culture. Of 177 students participating in this study 43 were male and 129 were female. Five failed to report gender. The sample included 90 freshman, 38 sophomores, and 46 juniors. There were no seniors. Three failed to indicate their class. Indicator of academic achievement

employed in the present study was a self-reporting academic achievement. Those reported academic achievement to be in the top 20% were 19, bottom 20% were 41, and neither top nor bottom 20% were 114. Three did not report their academic achievement.

Instrument

The first author of the present study translated the original English version of the academic DOSC scale, Form H into Japanese. The rendition in Japanese consisted of six factor subscales including ASP, ANX, AIAS, LAI, IA, and STR. Two Japanese college students enrolled in a graduate school in a Los Angeles area completed the questionnaire as a pilot test to ascertain that the question items in the DOSC scale would pose no ambiguity to the respondents. They reported no ambiguity. A retired high-school principal in Japan, who was also familiar with the current practice of education in Japan checked the questionnaire items to ensure that the school-related practices and activities reflected in the DOSC scale apply to the culture of Japanese universities. He reported no conflicting practices and activities. A Japanese-English bilingual person who had not seen the original English version of the DOSC scales back-translated the form into English. The researcher together with the author of the original English version of the DOSC scales checked the accuracy of the translation and judged it to be appropriate.

The Japanese version of the six-factor DOSC scale, Form H is a 96-item scale consisting of six subscales (ASP, ANX, AIAS, LAI, IA, STR) with 16 items per subscale. Each item is weighted on a 5-point *Likert* scale ranging from 1 (*Never*) to 5 (*Always*). A potential range of scores for each of the six subscales was from a minimum of 16 to a

maximum of 80 with higher scores reflecting the greater manifestation of the hypothesized construct each subscale represented. In order to minimize the possibility of response sets, items were distributed in a cyclical manner throughout the DOSC scale so that every sixth item would form one factor subscale. The three demographic variables were included to investigate relationships, if any, between scores on each of the six factor subscales and the three selected demographic variables, that is, class, gender, and academic achievement. The following scores were assigned to the demographic variables: Freshman (1), sophomore (2), junior (3), and senior (4); male (1) and female (2); for academic achievement top 20% (1), middle (2), bottom 20% (3).

Administration

The Japanese version of the six-factor DOSC scale, Form H is a self-reporting questionnaire requiring approximately 20 to 30 minutes to complete. Two hundred sets of questionnaire and answer sheet were mailed to an instructor at a participating college. A letter accompanying the questionnaires provided the instructions for administration. The instructions included that students would answer anonymously, that there were no right or wrong answers, and that students were to choose only one answer that best describes his or her attitudes, feelings, or opinions. One hundred seventy seven students completed the questionnaires. The completed questionnaires were collected in class on the same day and later mailed back to the researcher.

Data Analyses

The following psychometric analyses employing the SPSS (1990) and the EQS (Bentler, 1989) were performed in the present study.

1. The means, standard deviations, and intercorrelations of the six factor subscales were calculated.
2. Item analyses were carried out to determine the correlations of each of the 96 items with (a) the total score of the subscale of which it was intended to be a member and with (b) the total scores of the subscales of which it was not intended to be a member.
3. A coefficient alpha estimate of internal consistency was calculated for each of the six subscales.
4. A series of Z-test were performed to determine differences in the mean scores across the classes and academic achievement and between genders.
5. Confirmatory factor analyses (CFA) were performed to test the construct validity of scores on the Japanese version of the DOSC, Form H. In performing the CFA the present study followed a partial disaggregation model (Bagozzi & Heatherton, 1994) that portrays each factor dimension as a separate latent variable consisting of subsets derived from a larger set of test items. In the present study each of the six subscales were grouped into four subsets, each consisting of four items. The procedure yielded a total of twenty-four subsets from the six factor subscales. The scores on these subsets were subsequently intercorrelated and factor analyzed. The EQS program (Bentler, 1989) performed the CFA on the following alternative models: (i) a general

factor model indicating a Japanese version of the DOSC scale, Form H is a uni-dimensional instrument, (ii) an oblique two-factor model with one factor representing positive affect (ASP, AIAS, LAI, IA) and the other representing negative affect (ANX, STR), (iii) an oblique five-factor model with each of ASP, ANX, IA, STR and a composite of LAI and AIAS, and (iv) an oblique six-factor model hypothesizing that the Japanese version of the DOSC scale, Form H is a six dimensional instrument. Previous studies (Al-Samarrai *et al.*, 1993; Paik & Michael, 1999) involving exploratory factor analyses revealed a merger of the LAI and AIAS subscales, which led to a decision of including a five-factor model as an alternative model in the present study.

Findings

Preliminary Statistics

Table 1 shows intercorrelations of the scores of the six factor subscales, internal-consistency (alpha) estimates of reliability, and subscale means and standard deviations.

Insert Table 1 around here

Mean score and standard deviation for each of the six-factor subscales was 43.76 and 9.75 for ASP, 40.35 and 9.48 for ANX, 40.98 and 8.59 for AIAS, 31.91 and 8.76 for LAI, 46.57 and 8.03 for IA, and 41.49 and 10.27 for STR. Intercorrelations among the six subscales ranged from -.01 to .66. The highest correlation coefficient of .66

occurred between AIAS and LAI ($p < .00001$). The lowest correlation coefficient of -.01 occurred between the ANX and IA subscales ($p = .8656$). In the correlation matrix presented in Table 1, 10 out of 15 correlations were significant at varying degrees ranging from $p < .00001$ to $p = .02$. Earlier studies involving various forms of the DOSC scale (Caracosta & Michael, 1986; Paik & Michael, 1999) also reported rather high correlation coefficients between ASP and LAI and the results of the present study were consistent with their findings. In the present study the correlation coefficients between the subscales representing negative affect (ANX, STR) and the positive affect (ASP, AIAS, LAI, IA) revealed low to negative correlation. The range of correlation coefficient between ANX and each of the subscales representing positive affect was from -.01 to .28, with the highest correlation coefficient of .28 registered between the ASP and ANX subscales. In the same token the STR subscale ranged from -.03 to -.28, with the highest correlation coefficient of -.28 registered between the IA and STR subscales. Past studies (Crowder & Michael, 1991; Al-Samarrai *et al.*, 1993; Villar *et al.*, 1995a, 1995b; Smith *et al.*, 1997) equivocally reported low and often negative correlation in the cases just cited. The results of the present study were congruent to those reported in the past.

Internal Consistency Estimates of Reliability

As shown in Table 1 for each of the six-factor subscales (ASP, ANX, AIAS, LAI, IA, STR) the respective internal consistency estimate of reliability was .87, .82, .82, .87, .83, and .87. These coefficients were comparable to those reported in the earlier studies

(Crowder & Michael, 1991; Al-Samarrai *et al.*, 1993; Villar *et al.*, 1995a, 1995b; Smith *et al.*, 1997). Within each of the six 16-item subscales (ASP, ANX, AIAS, LAI, IA, STR) the numbers of items that were correlated more highly with their intended subscale than with any other subscales was 15, 14, 15, 16, 16, and 16, respectively. Four out of 96 items failed to correlate more highly with their intended subscale than with any other subscales. This outcome was a hit-rate of 96%.

CFA

To examine the underlying factor structure of scores on the Japanese version of the DOSC scale, Form H CFA was performed with the maximum likelihood (ML) method of estimation according to the procedures described in the EQS Structural Equations Program Manual (Bentler, 1989). Inspection of items revealed a full range of scores, thus a restriction of range was not evident. EQS provides several indices of an overall estimate of the closeness of fit of the models. Among such indices are χ^2, χ^2/df (Joreskog and Sorborm, 1989), Non-normed Fit Index (NNFI) (Bentler & Bonnet, 1980), Normed Fit Index (NFI) (Bentler & Bonnet, 1980), and Comparative Fit Index (CFI) (Bentler, 1989), and RMSEA. RMSEA values between .05 and .08 are considered acceptable and greater than .1 not acceptable (Browne & Cudeck, 1993). Smaller values of χ^2, χ^2/df indicate a closer degree of fit between a given model and the observed data. Values of greater than .90 for NNFI, NFI, and CFI are standard cutoff points for adequate fit.

Table 2 summarizes the outcomes of the confirmatory factor analyses.

Insert Table 2 around here

As indicated by the goodness-of-fit indices in Table 2, the *a priori* six-factor oblique model yielded the best fit of indices in terms of χ^2, χ^2/df, NFI, NNFI, CFI and RMSEA among all the alternative models. The χ^2, χ^2/df, NFI, NNFI, CFI, and RMSEA for a one-factor model were 1384, 5.49, .426, .419, .469, and .15 respectively; for a two-factor model 881, 3.52, .634, .673, .704, and .12 respectively; for a five-factor model 1347, 5.28, .441, .446, .488, and .16 respectively; for a six-factor model 454, 1.91, .812, .881, .898, and .07, respectively. As mentioned earlier the standard cutoff point of NFI, NNFI, and CFI is values greater than .90. Although the six-factor model failed to meet this conventional cutoff point, the CFA afforded significantly better indices of closeness of fit than did any of their alternative models, indeed suggesting the presence of the *a priori* six dimensions.

Comparison of Scores on the Subscales of the DOSC-Form H by Class, Gender, and Academic Achievement

Table 3 shows means and standard deviations of scores on the six factor subscales by demographic variables.

Insert Table 3 around here

A series of *Z*-tests yielded the following results: (a) female students scored lower on the *Leadership and Initiative* subscale than male students ($Z = 2.47$, p = .0134); (b) sophomores scored higher on the *Stress* subscale than freshmen ($Z = 3.03$, $p = .0024$) and juniors ($Z = 3.64$, $p = .0003$), scored lower on the *Aspiration* ($Z = -2.7$, $p = .0068$), *Academic Interest and Satisfaction* ($Z = -3.34$, $p = .0009$), and *Identification versus Alienation* ($Z = -2.04$, $p = .04$) subscales than freshmen, and scored lower than juniors in the *Academic Interest and Satisfaction* ($Z = 2.71$, $p = .0067$), and *Identification versus Alienation* ($Z = 2.14$, $p = .0318$) subscales; (c) high academic achievers scored higher than low academic achievers on the *Aspiration* ($Z = 3.71$, $p = .005$). The index of academic achievement employed in the present study was a self-reporting class standing. Japanese colleges do not make such standing available to students (a personal communication, 2000); therefore, the academic achievement reported here are the participants' personal evaluations of their rank, which might or might not reflect the true evaluation of their academic achievement.

Discussion

The present paper investigated the reliability and the construct validity of scores on the Japanese version of the DOSC scale, Form H for college students. The theoretical framework set forth by Michael and his colleagues in developing the original English version of the DOSC scale, Form H for college students as well as Form W for adults in

the workplaces served as a conceptual model in the development of the scale. The results of internal consistency reliability for each of the six subscales suggest that they are reasonably reliable measures. The results of CFA suggest that scores on the Japanese version of the DOSC scale, Form H can reproduce the same constructs as those captured in scores of the English version of the six-factor DOSC scale, Form H. The present study thus provides further evidence for earlier findings of the multidimensionality of the DOSC scale as well as an evidence of a moderate to high degree of invariance of such multidimensionality across rather diverse cultures.

The present study has several weaknesses. First, the present study employed a sample size of 177 subjects. The most widely quoted rule-of-thumb for CFA states that a sample size should be at least 200 (Boomsma, 1982). On the other hand some studies (Anderson and Gerbing, 1984) found that for models with at least three indicators per factor sample sizes as small as 150 generally would be adequate. The present study conformed to the less stringent guidelines of the latter; however, the study needs to be replicated with a larger sample to ascertain the degree to which the findings of the present study would be generalized to a broad spectrum of college student population in Japan.

Second, when studies involve language translation of scale as such was the case with the present study, whether the findings are characteristics of the observed data or of the translation remains as a question. Although the present study attempted to create a scale identical to its original form in all ways but language, whether the translated scale is truly parallel to its original English form remains to be determined. Ideally a single group

BEST COPY AVAILABLE

of individuals taking both versions of the scale generating similar scores will confirm the equivalence of the two scales. Modifying translation of items particularly those failing to correlate more highly with their target subscales as well as those revealing marginal loadings on their target factors might lead to findings other than reported in the present study.

Comparisons of scores by class revealed that sophomores compared with their lower- and upper-classmen display more stress and less academic interest and satisfaction and weaker sense of belonging to the school and its environment. The same subjects compared with their lower-classmen have less aspiration for academic attainment. The degrees to which these particular findings can be generalized to other sophomore populations need further investigation. Comparisons of scores by self-reporting academic achievement indicated that high achievers compared with low achievers have more aspiration, more interest, and readiness to take leadership in school related matters. However, as mentioned earlier, this finding needs to be interpreted with caution since in the present study there was no way of validating the self-reporting academic achievement against other objective measures of academic achievement.

Nevertheless, the present study provides promising support for the reliability and construct validity of the Japanese version of the DOSC, Form H. It has the potentials to become a useful diagnostic tool for concerned educators and counselors to identify students experiencing difficulty arising from poor academic self-concept in Japanese colleges. Researchers have long discussed the influence of situation and environment on

the development of self-concept. Today colleges and universities in both Japan and the U. S. A. are accepting students from each other with increasing numbers. As students begin to assimilate to a new culture, educators need to be aware of how such assimilation can lead to dramatic changes in ways those students appraise themselves and possible negative consequences. A potential consequence is a failure of a student fails regardless of his or her promising potential because of negative self-concept, and unintentional contribution by schools and educators to the development of such negative self-concept. The DOSC scale, Form H could serve as a useful diagnostic tool to screen such cases.

References

Al-Samarrai, N., Michael, W. B., & Hocevar, D. (1993). The development and validation of an Arabic version of an academic self-concept scale. *Educational and Psychological Measurement*, 53, pp. 249-257

Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika*, 49, pp.155-173

Bagozzi, R. P., & Heatherton, T. T. (1994). A general approach to representing multi-faceted personality constructs: Aplication t self-esteem. *Structural Equation Modeling, 1*, 35-67.

Bentler, P. M. (1989). *EQS: Structural equations program manual*, BMDP Statistical Software, Los Angeles

Bentler, P. M., & Bonnet, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, pp. 588-606

Boomsma, A. (1982). The robustness of LISREL against small sample sizes in factor analysis models, in: K. G. Joreskog & H. Wold (eds.), *Systems under indirect observation; Causality, structure, prediction*, North-Holland, New York, pp. 165-173.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In L. M. Collins & J. L. Horn (Eds.), Testing structural equation models (pp. 136-162). Thousand Oaks, CA: Sage.

Caracosta, R., & Michael, W. B. (1986). The construct and concurrent validity of a measure of academic self-concept and one of locus of control for a sample of university students. *Educational and Psychological Measurement, 46,* 735-744.

Crowder, B., & Michael, W. B. (1989a). The construct validity of a revised form of a self-concept measure for employees in a work setting. *Educational and psychological Measurement*, 49, pp. 421-431.

Crowder, B., & Michael, W. B. (1989b). The measurement of self-concept in a n employment setting. *Educational and Psychological Measurement*, 49, pp.19-31.

Crowder, B., & Michael, W. B. (1991). The development and validation of a short form of a multidimensional self-concept measure for high technology employees. *Educational and Psychological Measurement*, 51, pp. 447-454.

Foraker, B. M., & Michael, W. B. (1994). Reliability and construct validity of the Dimensions of Self-Concept (DOSC)-Form W measure for an Air Force sample. *Educational and Psychological measurement*, 54, pp. 409-416.

Joreskog, K. G., & Sorborm, D. (1989). *LISREL 7: User's reference guide* (1st ed.), Scientific Software, Mooresville, IN.

Michael, W. B., Smith, R. A., & Michael, J. J. (1989). *Dimensions of Self-Concept (DOSC): A technical manual* (rev. ed.), EdITS, San Diego

Paik, C. M., & Michael, W. B. (1999). A construct validity investigation of scores on a Japanese version of an academic self-concept scale for secondary school students. *Educational and Psychological Measurement*, 59, pp. 98-110

Paik, C. M., & Michael, W. B. (in press). The reliability and construct validity of scores on the six-factor DOSC (Dimensions of Self-Concept) scale for college students. *Educational and Psychological Measurement.*

Reisberg, L. (Jan. 28, 2000). Student stress is rising, especially among women. *The Chronicle of Higher Education,* 46 (21), pp. A49.

Smith, E. F., Michael, W. B., & Gribbons, B. (1997). A construct validity of a self-concept scale for a sample of hospital nurses. *Educational and Psychological Measurement,* 57, 494-504.

SPSS Plus. (1990). Chicago, Illinois

Villar, I. D., Michael, W. B., & Gribbons, B. (1995a). The development and construct validation of a Portuguese version of an academic self-concept scale. *Educational and Psychological Measurement*, 55, pp. 115-123.

Villar, I. D., Michael, W. B., & Gribbons, B. (1995b). Further evidence of construct validity of reliability of a Portuguese version of an academic self-concept scale. *Educational and Psychological Measurement*, 55, 1032-1038.

Wilgoren, J. (Jan. 24, 2000). More than ever, first-year students feeling the stress of college, *New York Times*, pp. A18.

Table 1

Means, Standard Deviations, and Intercorrelations of Scores on Six Factor Subscales of a Japanese Version of the DOSC Scale, Form H Including Internal-Consistency Estimates of Reliability of Scores Along the Principal Diagonal (N = 177)

DOSC Subscales	I	II	III	IV	V	VI	Mean	SD
Level of Aspiration	(87)	28	58	56	41	-03	43.76	9.75
Anxiety	28	(82)	08	01	-01	57	40.35	9.48
Academic Interest and Satisfaction	58	08	(82)	66	37	-08	40.98	8.59
Leadership and Initiative	56	01	66	(87)	37	-08	31.91	8.76
Identification vs. Alienation	41	-01	50	37	(83)	-28	46.57	8.03
Stress	-03	57	-18	-08	-28	(87)	41.49	10.22

Note: Decimal points have been omitted for factor subscales I through VI. The numbers in parentheses indicate internal consistency estimates of reliability.

Table 2

Goodness-of-Fit Results for All Models (N = 177)

Model Description	No.of Variables	No. of Factors	*df*	χ^2	χ^2/df	NFI	NNFI	CFI	RMSEA
One-factor model	24	1	252	1384	4.07	.426	.419	.469	.15
Oblique 2-factor model F1=ASP/AIAS/LAI/IA; F2=ANX/STR	24	2	250	881	2.80	.634	.673	.704	.11
Oblique 5-factor model F1=ASP; F2=AIAS/LAI F3=ANX; F4=IA; F5=STR	24	5	225	1347	3.49	.441	.446	.488	.16
Oblique 6-factor model	24	6	237	454	1.83	.812	.881	.898	.07

Note. NNFI = non-normed fit index; NFI = normed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation

Table 3

Means and Standard Deviations of Scores on the Six Factor DOSC Scale by Demographics

		ASP	ANX	AIAS	LAI	IA	STR
Freshman	Mean	45.47	40.98	42.26	32.04	47.09	40.78
(n = 89)	SD	9.83	9.32	8.95	9.12	8.25	11.28
Sophomore	Mean	40.84	41.39	37.31	30.63	44.02	46.00
(n = 38)	SD	8.36	9.11	7.01	7.18	7.52	7.62
Junior	Mean	42.88	38.32	41.88	32.37	47.64	39.37
(n = 46)	SD	10.39	9.83	8.44	9.24	7.89	9.06
Male	Mean	43.07	37.83	41.40	34.92	46.69	40.27
(n = 43)	SD	11.53	9.91	10.40	10.35	9.58	10.71
Female	Mean	44.06	41.03	40.96	30.66	46.62	41.75
(n = 128)	SD	9.24	9.15	8.03	7.81	7.58	10.07

(Continued to the next page)

(Continued from the previous page)

High GPA	Mean	47.83	38.36	42.44	40.33	46.38	40.26
(n = 19)	SD	8.22	10.12	9.50	10.30	9.09	10.25
Mid GPA	Mean	44.96	40.23	42.10	31.83	46.98	40.52
(n = 114)	SD	9.29	8.78	7.72	7.53	7.42	9.63
Low GPA	Mean	38.67	41.38	36.85	28.61	45.89	44.42
(n = 41)	SD	10.14	11.07	9.36	9.13	9.31	11.20
Total	Mean	43.76	40.35	40.98	31.91	46.57	41.49
(N = 177)	SD	9.75	9.48	8.59	8.76	8.03	10.22